REMARKS

A. Concerning the Priority Claim and the Amendments

This application is a continuation of US Application Serial No. 09/544,742, filed April 7, 2002, which claims the benefit of US Provisional Application Serial No. 60/128,390, filed April 8, 1999.

Please cancel Claims 8, 10-17, and 19-21 without prejudice, as shown in the listing of claims hereinabove. Claims similar to the canceled claims are presently co-pending in the aforementioned parent application Serial No. 09/544,742, filed April 7, 2000. Accordingly, the canceled claims are not needed in the present application.

Original Claims 1-7, 9, 18, and 22-34 remain pending in this application. Corresponding claims were canceled from the aforementioned parent application Serial No. 09/544,742, and are continued herein as the aforementioned claim numbers.

New Claim 35 has been added, which is similar to Claim 33, with two added features: (a) the reducing agent and gold compound are required to be impregnated either simultaneously or sequentially; and (b) the impregnation is required to occur without precipitation. Support for part (a) is found in the specification at page 17, lines 4-18, and in Examples 1-4 for sequential impregnation, and Examples 5-6 for simultaneous impregnation. In addition, the impregnation technique is inherently known in the art to exclude precipitation, and in this manner impregnation is a distinctly different technique from precipitation. Nevertheless, in order to emphasize the distinction explicitly, new Claim 35 states in part (b) that the impregnation occurs without precipitation. Support for this amendment is found at page 2, line 4, through page 4, line 4, of the specification, further in combination with page 7, lines 6-20, and the teachings referenced therein of Charles N. Satterfield, in *Homogeneous Catalysis in Practice*, McGraw-Hill, NY, 1980, pp. 70-72 and 82-83 *(copy enclosed in Information Disclosure Statement submitted concurrently herewith)*.

New Claim 36 is added depending from Claim 35 and further stipulating that the oxidation with oxygen in the presence of hydrogen requires greater than 0.01 mole percent hydrogen, based on the total moles of olefin, oxygen, hydrogen, and any optional diluent. Support for new Claim 36 is found at page 19, lines 4-6, of the specification.

Applicants estimate that no fee is required for the above claim amendments, based on a calculation of 24 total claims and 3 independent claims remaining after

amendment. Applicants have paid on filing for 34 total claims and 3 independent claims. If this estimate is incorrect, the Examiner is authorized to charge Deposit Account No. 04-1512 the required fee for the amendments.

B. Concerning US 5,502,020 (Iwakura et al.)

In parent application Serial No. 09/544,742, filed April 7, 2000, Claims 1-7, 9, 18, 22-27, 29-32, and 37 were rejected under 37 C.F.R. 35 U.S.C. 102(b), in an Office Action dated May 24, 2004 (hereinafter "the Office Action"), as allegedly being anticipated by Iwakura et al. (US 5,502,020). Subsequently, these claims were canceled in the parent application, in order to take to issuance other claims held to be allowable; however, the canceled claims are continued in the instant continuation application now as corresponding Claims 1-7, 9, 18, 22-27, 29-32, and 33, respectively. Thus, the rejection, as it might apply to Claims 1-7, 9, 18, 22-27, 29-32, and 33 of this continuation application, is traversed for the following reasons.

Iwakura et al. discloses preparing a catalyst capable of oxidizing ethylene with oxygen to form ethylene oxide. The catalyst is taught to contain silver, tungsten, cesium, and optionally one or more elements selected from a list of about 41 elements, including gold. Impregnation of the metals onto a support is disclosed, including any of five supports including titania. Ethanol and water are disclosed as solvents for dissolving the silver compound. Iwakura et al. is silent with respect to preparing a hydro-oxidation catalyst for an oxidation with oxygen in the presence of hydrogen. Inasmuch as Iwakura et al. pertains to the preparation of a direct oxidation catalyst, that is, a catalyst capable of oxidizing an organic compound (e.g., ethylene) with oxygen or air (inherently with no hydrogen or essentially no hydrogen), Iwakura et al. has no relevance to the claims.

In contrast, Claim 1 requires preparation of a "hydro-oxidation catalyst," that is, a catalyst capable of an oxidation with oxygen in the presence of hydrogen. The language "hydro-oxidation catalyst" goes beyond a statement of intended use to concretely identify a particular type of catalyst and its characteristic capabilities and properties. In general, a preamble limits the [claimed] invention if it recites essential structure or steps, or if it is 'necessary to give life, meaning, and vitality' to the claims. *Eaton Corp. v. Rockwell International Corp.*, 66 USPQ 2d, 1276, 1282 (Fed. Cir. 2003), (quoting *Pitney Bowes, Inc. v. Hewlett Packard Co.*, 182 F.3d 1298, 1305, 51 USPQ2d 1161, 1165 (Fed. Cir. 1999)). [A] claim preamble has the import that the claim as a whole suggests for it. In other words, when the claim drafter chooses to use *both* the preamble and the body to define the subject matter

of the claimed invention, the invention so defined, and not some other, is the one the patent protects." *Bell Communications Research, Inc. v. Vitalink Communications Corp.*, 55 F3d. 615, 620, 34 USPQ2d 1816, 1820 (Fed. Cir. 1995). The difference between a direct oxidation with oxygen or air and a hydro-oxidation with oxygen in the presence of hydrogen is a significant distinction, because the catalyst art is a highly unpredictable science. *Corona Co. v. Dovan Corp., 276 U.S. 358 (1928); In re Doumani, 47 CCPA 1120, 281 F.2d 215, 126 USPQ 408 (1960).*

The Office Action of the parent application argues that since hydrogen is present in air, a catalyst of the prior art, which is capable of direct oxidation with air, is not distinguishable from a hydro-oxidation catalyst, which is capable of oxidation with oxygen in the presence of hydrogen. The argument is flawed. Refer to US 4,007,135 and US 4,242,235 for an art-recognized description of direct oxidation. In contrast, refer to WO 96/02323 and WO 98/00414 for an art-recognized description of hydro-oxidation. *(Copies of record in Information Disclosure Statement, filed concurrently herewith.)* One skilled in the art knows that the trace of hydrogen present in air *(0.5 parts per million)* has negligible effect on direct air oxidations; otherwise air would be a flammable mixture and commercially practiced air oxidations would have vastly different processing constraints. Thus, the skilled artisan knows that direct air oxidations are not hydro-oxidations. Likewise, the skilled artisan knows that hydro-oxidations require an effective amount of hydrogen, typically, 200 to 2,000 times greater than that present in air. Moreover, the art recognizes that the product outcomes from hydro-oxidation processes are significantly different from the product outcomes of direct air oxidation processes. These distinctions, recognized in the art, support Applicants' position that hydro-oxidation catalysts have distinctly different capabilities and properties, as compared with direct oxidation catalysts. Accordingly, Iwakura et al., which teaches to preparing direct oxidation catalysts, does not pertain to and does not anticipate the claimed process drawn to preparing a hydro-oxidation catalyst.

The Office Action of the parent application maintains that such limitations as "0.5 parts per million hydrogen" or "hydrogen as a material element" are not present in the recited claims; and therefore, the claims are anticipated. The Office Action errs, because the instant claims clearly identify and limit the catalyst to a "hydro-oxidation catalyst." The very word "hydro-oxidation" requires capability to oxidize with oxygen in the presence of an effective amount of hydrogen; else the oxidation is not "hydro-oxidation." "Effective" in this sense means that hydrogen is a material and influential participant in the oxidation, not a non-material and non-influential component as found in air oxidations. Accordingly, Applicants

need not add explicit limitations that are already inherently present in the claims and recognized by the skilled artisan.

Nevertheless, new Claim 36 requires that the hydrogen of the hydro-oxidation process be present in an amount greater than about 0.01 mole percent, based on the total moles of olefin, oxygen, hydrogen, and any optional diluent. Thus, new Claim 36 lies outside the scope of direct air oxidations.

The rejection in the parent patent application argues that if the prior art structure is capable of performing the intended use, then it meets the claim. Iwakura et al. discloses all of at least 41 subsidiary metals as equivalent species; yet one skilled in the art is left wondering which of these disclosed metals are useful and which are detrimental in hydro-oxidation processes. Iwakura does not consider this question or provide an answer. Silence is never a proper substitute for a clear disclosure of facts. Consequently, it cannot be maintained that Iwakura et al. explicitly or inherently teaches a method of making a hydro-oxidation catalyst. Inherency may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient. *SGS-Thomson Microelectronics, Inc. v. International Rectifier Corp.*, 32 USPQ 2d 1496, 1503 (Fed. Cir.)

The rejection in the parent application argues that in a claim drawn to a method of making, the intended use must result in a manipulative difference as compared to the prior art. The outcome of Applicants' claimed method does indeed result in a manipulative difference. Hydro-oxidation catalysts catalyze more reaction pathways (e.g., hydrogenation of olefins and combustion of hydrogen to water, besides oxidation of the organic) and exhibit different selectivities (e.g., higher selectivities to olefin oxides), as compared with direct oxidation catalysts. The differences are typically illustrated with C3 and higher hydrocarbons rather than ethylene; therefore, the ethylene oxidation described in Iwakura et al. does <u>not</u> imply certain hydro-oxidation capability, but only sheds light on the disclosed direct oxidation process.

Moreover, the claimed "method of making" unequivocally requires manipulative selections over the prior art. Iwakura et al. discloses all subsidiary elements from Groups IB, IIB, IIIB, IVA, IVB, VB, and VIA and tellurium as equivalent species. The catalyst supports comprising alumina, silicon carbide, titania, zirconia, and magnesia are taught to be equivalent species. Water and alcohols are disclosed as <u>equivalent solvents</u>. No markers or trail blazers whatsoever, no suggestions or even hints, are provided by Iwakura et al. to illuminate what combination of these many disclosed components should be selected

and manipulated to make an active hydro-oxidation catalyst. In contrast, from this forest of details, Applicants select gold, select a titanium-containing support, and conceive of an organic reducing agent, which may be selectively alcohol, but *not* water, for preparing a hydro-oxidation catalyst, which exhibits different capabilities from a direct oxidation catalyst. The number of selections taken from the diverse teachings of Iwakura et al. and needed to achieve a different outcome precludes a finding of anticipation.

The Office Action maintains that little credence be given to an intended use limitation. The claims identify the prepared catalyst as a "hydro-oxidation catalyst," which language goes beyond intended use to a clearly defined catalyst capability or characteristic property, and by so doing, brings life, vitality, and meaning to the claims. When a preamble gives life and meaning to the claim, it is treated as a limitation and is not merely a statement of effect that may or may not be desired or appreciated. Instead, it is a statement of the intentional purpose for which the method must be performed. *Janson v. Rexall Sundown, Inc.*, 03-1069, 2003 U.S. app. LEXIS 18478 (Fed. Cir. 2003).

In view of the above, Claims 1-7, 9, 18, 22-27, and 29-32 and 33 of the instant continuation application are novel over Iwakura et al.

C. Concerning US 5,480,854 (Rajaram et al.)

Claims 1, 4-5, 18, 22-23, 26-28, and 20-32 [sic: 29-32?] of the parent application were rejected in the Office Action as allegedly being anticipated by Rajaram et al. (US 5,480,854). This rejection, as it might apply to corresponding Claims 1, 4-5, 18, 22-23, 26-28, and 29-32 of the present application, is traversed for the following reasons.

Rajaram et al. relates to preparing a catalyst for exhaust engines for complete combustion of carbon monoxide to carbon dioxide. In contrast, Applicants claim a process for preparing a "hydro-oxidation catalyst." Again, the preamble is intended to bring life, vitality, and meaning to the claims. The catalyst art clearly distinguishes between a combustion catalyst, capable of complete combustion of hydrocarbons with air to carbon dioxide and water, and a hydro-oxidation catalyst, capable of selective oxidation of hydrocarbons with oxygen in the presence of hydrogen typically to only partially-oxidized hydrocarbons.

More to the point, Rajaram et al. at Claim 2, and at Columns 5 and 6, teaches a catalyst prepared by co-precipitation to form a support having noble metals incorporated therein. Co-precipitation, which requires adding one solution to another solution to cause

one or more precipitates to form, is a distinctly different technique from the claimed impregnation technique. By contrast, impregnation requires adding one or more solutions containing dissolved compounds directly onto a solid support. Refer to Response D, filed August 6, 2003 in the parent application Serial No. 09/544,742, said response being incorporated herein by reference, which response explains in detail the art-recognized distinctions between co-precipitation and impregnation. The following three authoritative references were cited in said Response D and are cited again herein: Charles N. Satterfield, *Heterogeneous Catalysis in Practice*, McGraw-Hill Book Company, New York, 1980, pp. 70-72 and 82-83; "Structure and Activity of Silica Supported Nickel Catalysts," by J. W. E. Coenen and B. G. Linsen, in *Physical and Chemical Aspects of Adsorbents and Catalysts*, B. G. Linsen, ed., Academic Press, NY, 1970, p. 501; and J. W. Geus, "Production and Thermal Pretreatment of Supported Catalysts," in *Preparation of Catalysts III,* G. Poncelet, P. Grange, and P. A. Jacobs, eds., Elsevier Science Publishers B.V., Amsterdam, 1983, p.6 *(copies enclosed with Information Disclosure Statement submitted concurrently herewith).*

The Office Action of the parent application argues, "Both impregnation and co-precipitation are disclosed.... Since both methods are disclosed, a claim to either reads upon the disclosure of the prior art." The argument relies on cutting and pasting disconnected sections of Rajaram et al. to form the invention and prejudice the claims. This "cut and paste" approach to the prior art is not permissible. A fair reading of Rajaram et al. shows that no nexus is ever made between impregnation and reducing agents. Rather, Rajaram et al. teaches use of a reducing agent to prepare a noble metal colloid for use in *co-precipitating* the noble metal with the support. (Rajaram et al., Col. 5, lines 63-67, continuing onto Col. 6, lines 1-5) Rajaram et al. also teaches use of a reducing agent *to precipitate* a secondary metal oxide with the noble metal and support. (Rajaram et al., Col. 6, lines 39-44) Throughout all of Rajaram et al., reducing agents are used in connection with *co-precipitation methods*; while the impregnation technique is mentioned as an *alternative technique of lesser value and never in the context of impregnation with a reducing agent.* Hence, Rajaram et al. cannot anticipate the claims.

More to the point, Example 2 of Rajaram et al. illustrates a comparative experiment wherein chloroplatinic acid is impregnated onto ceria with no mention of reducing agent. Significantly, the impregnated catalyst of Rajaram et al., without reducing agent, shows *zero* activity for oxidation or reduction. Clearly, Rajaram et al. does not achieve the capability of a hydro-oxidation catalyst and therefore cannot anticipate the claims.

Finally, Rajaram et al. discloses noble metals of platinum, palladium, rhodium, and gold in equivalent capacity. Rajaram et al. discloses CeO_2, ZrO_2, TiO_2, SnO_2 as supports in equivalent capacity. To arrive at the invention from Rajaram et al., a skilled artisan would have had to select gold, to select a support containing titanium, to select impregnation over the preferred co-precipitation technique (*moreover, despite negative results illustrated for impregnated materials*), to conceive of an organic reducing agent to be used in conjunction with impregnation *rather than as disclosed with co-precipitation*, all for the purpose of preparing a hydro-oxidation catalyst, not an exhaust engine combustion catalyst. Since there are no trail-blazers or markers, no suggestions or hints whatsoever, to make the claimed selections for the explicit purpose of preparing a hydro-oxidation catalyst, Rajaram et al. does not anticipate the claims. Moreover, the manipulative selections made by Applicants result in a manipulative distinction over the prior art. Whereas the prior art results in a catalyst with selectivity to total combustion products (CO_2 and H_2O) or, alternatively, zero (0) activity, the claimed process as illustrated in Applicants' Examples results in a hydro-oxidation catalyst having high selectivity to partially-oxidized products, i.e., olefin oxides.

Accordingly, Claims 1, 4-5, 18, 22-23, 26-28, and 29-32 of the instant application are novel over Rajaram et al.

D. Concerning US 4,937,219 (Haruta et al.)

Claims 1-7, 9, 18, 22-23, 25-29, and 31-32 of the parent application were rejected under 35 U.S.C. 102(b) as anticipated by Haruta et al. (US 4,937,219), citing Example 12. This rejection, as it might apply to Claims 1-7, 9, 18, 22-23, 25-29, and 31-32 of the instant application, is traversed for the following reasons.

The Office Action in the parent application maintains a flawed interpretation of Example 12 by arguing, "Haruta discloses the support is impregnated with chloroauric acid and magnesium citrate ... which is a reducing agent." In fact, the reference makes no such disclosure. Rather, Haruta et al. in its entirety discloses a variety of *precipitation methods* with a gold compound and reducing agent to *precipitate* gold particles onto a support. Referring to Example 12:

(a) *An aqueous solution of magnesium nitrate is impregnated onto a honeycomb support.* Neither gold nor reducing agent is disclosed in this impregnation step, which is therefore irrelevant to the claims.

(b) *The honeycomb is immersed in a solution (1 liter) of chloroauric acid; pH is adjusted; and then an aqueous solution (500 ml) of magnesium citrate is added dropwise with stirring for one hour.*

A skilled artisan would recognize the disclosed immersion step as pertaining to a *precipitation* method, not an impregnation method. Precipitation requires that one solution is added to a second solution, typically at controlled pH, slowly and with stirring, to cause a precipitate (i.e., solids) to form and settle out. Here, Haruta et al. describes adding one solution to another at controlled pH, slowly and with stirring. The large volume of liquids (1500 ml) taught by Haruta et al. could not be substantially absorbed into the support, and indeed the support is later taught to be "separated from the solution." In contrast, impregnation simply involves one or more solutions being contacted with and absorbed directly onto a support. Solutions are not typically added one to the other under controlled pH slowly with stirring. Impregnation typically does not use large volumes of liquid, and most if not all of the liquid is typically absorbed into the support. The manipulations of Example 12 lead the skilled artisan to conclude precipitation, not impregnation.

To prove the point unequivocally, Haruta et al. at Examples 13, 14, and 15 describes very closely similar methods to the one contested in Example 12. All are referred to as "Second Method" and all use a reducing agent: magnesium citrate or formalin. Significantly, in these additional examples the description explicitly uses the words "precipitation" or "inducing precipitation" of gold particles. Accordingly, it cannot be maintained that Example 12 relates to an impregnation of gold and reducing agent.

In view of the above, Applicants are not required to incorporate liquid volume and liquid absorption amounts into their claims, where one skilled in the art would already recognize the distinctions inherently present in the claim language "impregnation," as compared with a prior art description of "precipitation." Accordingly, Claims 1-7, 9, 18, 22-23, 25-29, and 31-32 of the instant application are novel over Haruta et al.

It is further noted that new Claims 35 and 36 use the claim language "impregnation without precipitation," thereby emphasizing the distinction over the cited art.

E. Concerning EP-A1-0,709,360

The Examiner's attention is directed to European patent publication no. EP-A1-0,709,360 *(copy enclosed in Information Disclosure Statement, filed concurrently*

herewith), which discloses a method of preparing a hydro-oxidation catalyst by impregnating a gold compound onto a titanium-containing support. No reducing agent is mentioned or illustrated. Like Rajaram et al., the reference teaches of the impregnated material "absolutely no catalytic activity is found." Consequently, Applicants' recognition of the criticality of impregnating gold *and impregnating a reducing agent onto a support* for the purpose of preparing an active and selective hydro-oxidation catalyst speaks for the novelty and non-obviousness of the claims.

F. Conclusions

In view of the amendments and remarks, it is submitted that Claims 1-7, 9, 18, and 22-36 of the instant continuation application meet all of the requirements for patentability. A Notice of Allowance is respectfully solicited at the Examiner's earliest convenience.

Respectfully submitted,

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